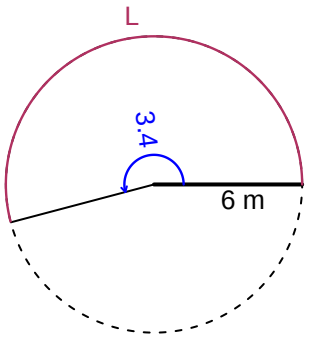
Name: Date:

Trig Final (SLTN v644)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 3.4 radians. The radius is 6 meters. How long is the arc in meters?

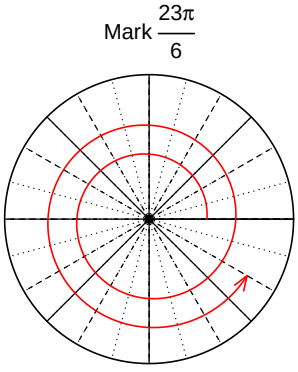


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

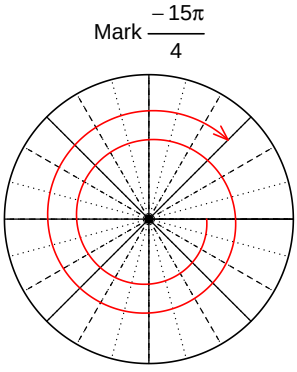
$L = 20.4$ meters.

Question 2

Consider angles $\frac{23\pi}{6}$ and $\frac{-15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{23\pi}{6}\right)$ and $\cos\left(\frac{-15\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(23\pi/6)$



Find $\cos(-15\pi/4)$

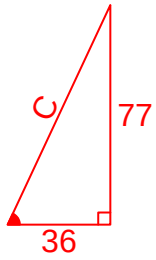
$\sin(23\pi/6) = \frac{-1}{2}$

$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-77}{36}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

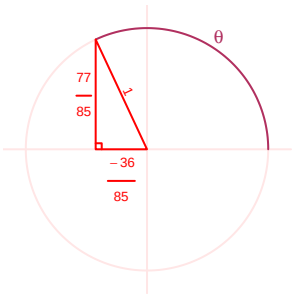
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$36^2 + 77^2 = C^2$$
$$C = \sqrt{36^2 + 77^2}$$
$$C = 85$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-36}{85}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 8.53 meters, a frequency of 3.81 Hz, and a midline at $y = -5.72$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.53\cos(2\pi 3.81t) - 5.72$$

or

$$y = -8.53\cos(7.62\pi t) - 5.72$$

or

$$y = -8.53\cos(23.94t) - 5.72$$